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REPUBLIC OF KOREA PENINSULA MASTER PLAN:

DECISION PAD CALCULATIONS

Engineer Studies Center

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REPUBLIC OF KOREA
PENINSULA MASTER PLAN:

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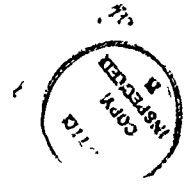

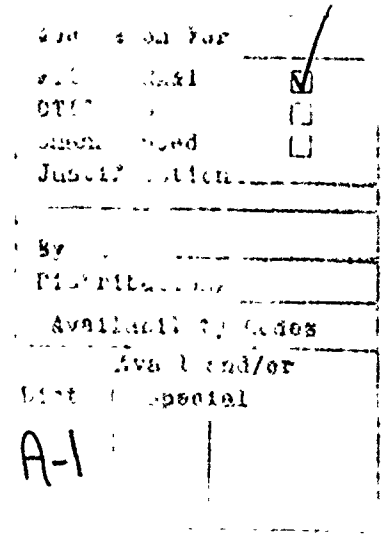

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(U) The ROK Peninsula Master Plan (PMP) defines and assesses options for restationing U.S. Forces on installations within the ROK during FY1991-FY2000. It establishes a set of criteria for USFK planers to use to evaluate the relative desirability of retaining installations. This paper explains the details of the calculations used in the PMP by showing an example of the calculations for one sample installation.

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DECISION PAD CALCULATIONS

1. **PURPOSE.** This paper explains the numbers and calculations used to develop the installation rankings list presented in the *Republic of Korea Peninsula Master Plan* (PMP) study prepared by the Engineer Studies Center.

2. **BACKGROUND.** During the development of the PMP study, the sponsor requested a set of detailed sample calculations to show how the Decision Pad program uses the criteria values and weighting factors to produce the final scores for installations. The program bases the calculations on simple formulas. However, the multiple levels of criteria used to capture installation characteristics make the description of the computation process complex. For this reason the PMP final report explains the general methodology in enough detail to allow readers to understand the basic principles involved in the calculations. This paper includes the detailed, step-by-step, calculations for one installation to assist facility planners involved with follow-on analysis and implementation of installation changes.

3. **METHOD.** The input used in several Decision Pad worksheets determines the installation rankings list. This paper explains the calculations used to determine each entry in the different Decision Pad worksheets. Camp Giant (KS 420) is used as an example.

4. **STRUCTURE.** The criteria used to evaluate the installation closure priorities for Korea is divided into four different levels. Each level contains different groupings, with each group weighting factors adding to 100. **Figure 1** shows the different criteria, groupings and weighting factors for each level.

5. **DECISION PAD WORKSHEETS.** The Decision Pad software allows only two levels of groupings per worksheet. Since this study uses four levels of criteria data, it is necessary to develop "sub-worksheets" that are pulled together by a final worksheet. The sub-worksheets used in the study are: Facilities; Medical; Infrastructure; Safety; and Morale, Welfare and Recreation. The Final worksheet, pulls ratings from the five listed sub-worksheets, combines them with location, size and urbanization data, and gives the final rankings for all forty installations.

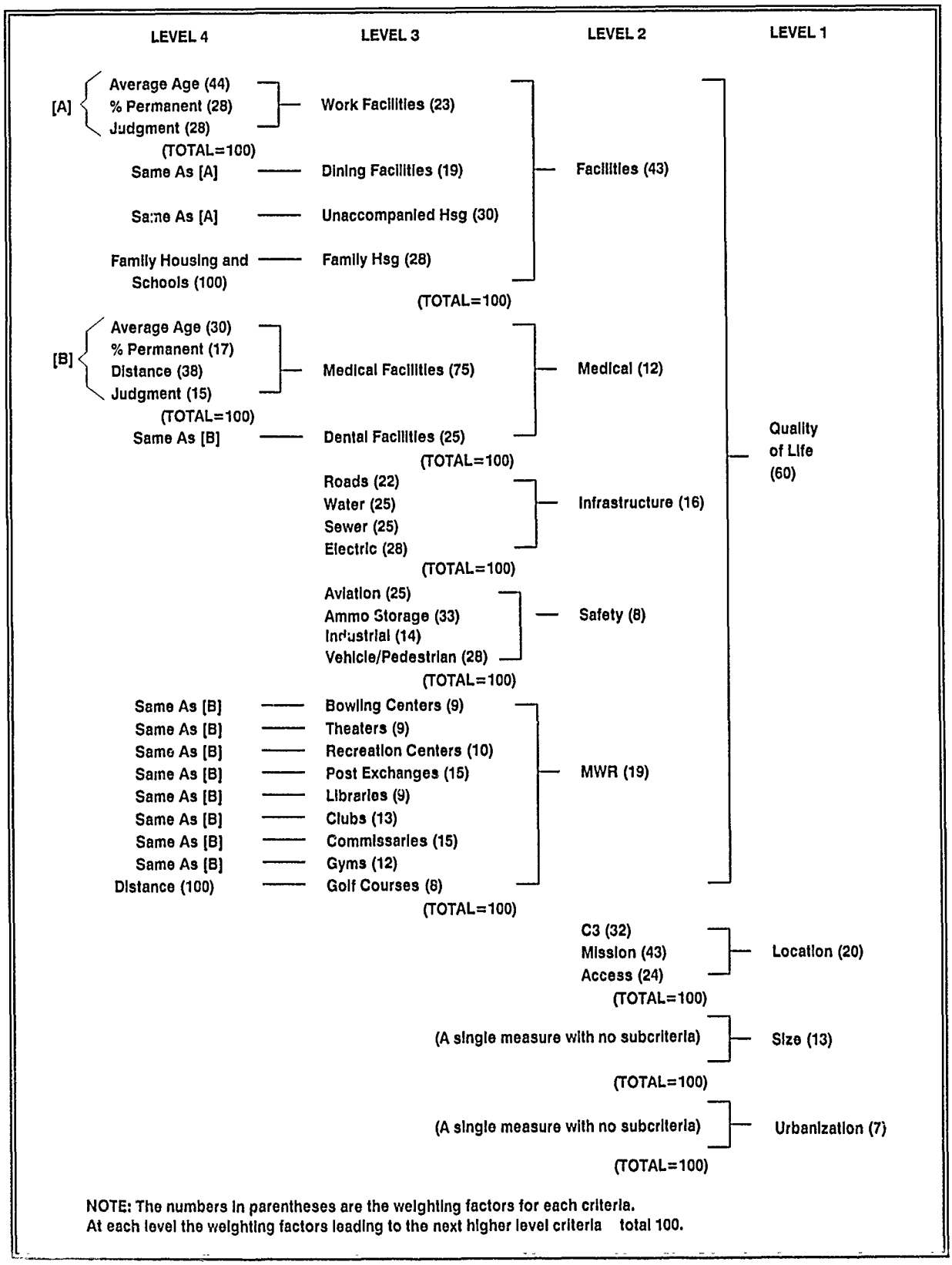

Figure 1. CRITERIA LEVELS AND WEIGHTING FACTORS

6. **FACILITIES WORKSHEET.** The facilities worksheet contains four major criteria: work facilities; dining facilities; unaccompanied personnel housing facilities; and family housing and schools. Results from opinion surveys determine the weighting factors that apply to each of these criteria. While in Korea, the study team from the Engineer Studies Center distributed facilities weighting factors opinion surveys asking the experts to determine weighting factors for work, dining, unaccompanied personnel housing and family housing facilities. The study team averaged the results of the surveys to determine study weighting factors. **Figure 2** shows a sample survey used to determine weighting factors for the facilities worksheet.

FACTORS TO BE WEIGHTED WITHIN FACILITIES

Consider the following factors that will be used to evaluate FACILITIES, based on their relative importance to United States Forces Korea as restationing options are examined.

1. **In your opinion how important are WORK FACILITIES?** ___%
2. **In your opinion how important are DINING FACILITIES?** ___%
3. **In your opinion how important is UNACCOMPANIED PERSONNEL HOUSING?** ___%
4. **In your opinion how important are FAMILY HOUSING AND SCHOOLS (where applicable)?** ___%

100 %

Figure 2. FACILITIES WEIGHTING FACTORS OPINION SURVEY

a. **Facilities Worksheet for Camp Giant.** **Figure 3** shows the Facilities Decision Pad entries for Camp Giant.

CRITERION	WEIGHT	RATINGS
Work Facilities	23	3.90
Average Age Factor	11	3.85
% Permanent	6	2.80
Judgment Factor	6	5.00
Dining Facilities	19	5.00
Average Age Factor	9	2.16
% Permanent	5	10.00
Judgment Factor	5	5.00
Unaccompanied Housing	30	7.30
Average Age Factor	13	7.50
% Permanent	8	9.40
Judgment Factor	9	5.00
Family Housing & Schools	28	0.00
Available?	28	0.00

Figure 3. CAMP GIANT FACILITIES WORKSHEET ENTRIES

b. **Work Facilities.** The work facilities criteria consists of three factors: average age; percent permanent; and a judgment factor.

(1) *Average Age Factor.* The work facility average age factor is found by determining the average age of work facilities at each installation and assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* Using the database file dated June 19, 1990 from the Facilities Information and Planning System (FIPS), a list of work facilities was obtained. Records counted as work facilities if they had catcodes beginning with 610, or had one of the following catcodes: 21408, 21410, 21420, 21430, 21435, 21470, 21490. **Figure 4** gives a list of records used from the FIPS system for work facilities at Camp Giant. The database contained the catcode, the size of the facility, and the year of the facility was built. The two columns showing the age and the age multiplied by size were used to determine the average age of the work facilities at Camp Giant. To determine the average age of the work facilities at Camp Giant, divide the total age multiplied by the size of all work facilities--by the total size of all work facilities.

CATCODE	YEAR BUILT	SIZE (SF)	AGE (1990)	AGE x SIZE
21410	1968	2155	22	47410
21408	1982	96	8	768
21410	1984	3995	6	23970
61021	1958	8665	32	277280
61021	1958	1540	32	49280
61050	1958	960	32	30720
61021	1966	960	24	23040
61050	1967	1440	23	33120
61023	1967	1920	23	44160
TOTALS:		21731		529748

AVERAGE AGE: 529748/21731 = 24.38 years

Figure 4. WORK FACILITIES AVERAGE AGE CALCULATIONS

(b) *Average Age Factor.* An average age was determined for work facilities at the installations. Each installation was assigned an average age factor on a scale ranging from one to ten. Calculate this factor by:

-- subtracting the lowest average age from the installation age

-- dividing the total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest calculated average age at any installation for the work facilities criteria was 39. The lowest calculated average age at any installation for the work facilities criteria was 1. The average age factor for Camp Giant (3.85) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((24.38 - 1)/(39 - 1))] = 3.85$$

(2) *Percent Permanent Factor.* The work facility percent permanent factor is found by determining the percentage of work facilities at an installation located in permanent or semi-permanent buildings. The list of work facilities for each installation is divided into two groups, permanent and temporary, using the FIPS database. Permanent buildings included facilities in permanent or semi-permanent buildings. The total square footage of permanent work facility buildings is divided by the total square footage of all work facility buildings. Multiply the sum by ten, and the percent permanent factor used in the study is found. Camp Giant's percent permanent factor is 2.8. Figure 5 shows the list of work facilities for Camp Giant and the calculations to determine the installation's percent permanent factor.

CATCODE	TYPE OF BUILDING	SIZE (SF)
21410	Temporary	2080
61090	Temporary	960
21410	Temporary	2112
	TOTAL:	5152
21410	Semi-Permanent	6544
21470	Semi-Permanent	120
21410	Semi-Permanent	3637
21410	Semi-Permanent	3003
21410	Semi-Permanent	5260
21470	Semi-Permanent	81
	TOTAL:	18645

(18645/(18645+5152)) x 10 = 7.8

Figure 5. WORK FACILITIES PERCENT PERMANENT CALCULATIONS

(3) *Judgment Factor.* Each of the forty installations is assigned a judgment factor rating ranging from one to ten. Judgment factors are included to give experts on a particular criteria an opportunity to express their opinions on the condition of different facilities. The facility judgment factor was determined by input from opinion surveys. Opinion survey ratings were averaged to determine a single facility rating for each of the installations.

(a) *Opinion Surveys.* While in Korea the study team distributed opinion surveys. Experts were asked to evaluate facilities at each of the installations. The facilities survey asked the experts to give a single facilities rating for each installation. Two categories of facilities were considered in the survey: facilities and family housing. The two categories received ratings of good, fair, or poor at each installation. Ratings for each installation were determined by averaging the results. The facilities category includes dining facilities, work areas and unaccompanied personnel housing areas. The family housing category considers only installations that have family housing and schools. Only three of the forty installations (Camp Henry, Camp Walker and Camp Hialeah) studied contain family housing and schools. Figure 6 shows a portion of a sample facilities survey used to evaluate dining, family housing, unaccompanied personnel housing and work facilities.

(b) *Judgment Rating.* Survey results were averaged to determine a facilities rating for each installation. Each of the possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points at each installation were totaled and divided by the number of surveys received to obtain an average rating. Camp Giant received a facilities judgment rating of 5.0.

FACILITIES EVALUATION: WORK AREAS, DINING

FACILITIES, UPHs & FAMILY HOUSING (if applicable)

	FACILITIES			FAMILY HSG (IF APPLICABLE)			N/A OR DON'T KNOW
	GOOD	FAIR	POOR	GOOD	FAIR	POOR	
WESTERN CORRIDOR							
CAMP EDWARDS		X					
CAMP HOWZE	X						
CAMP PELHAM	X						
CAMP GARY OWEN		X					
CAMP GIANT		X					
CAMP BONIFAS	X						
STANTON		X					
CAMP GREAVES	X						
CAMP LIBERTY BELL		X					

Figure 6. FACILITIES OPINION SURVEY

(4) *Work Facilities Rating.* The overall work facilities rating is found by multiplying the three factors times their weighting factor divided by the sum of the weighting factors, and adding. The work facilities rating is:

$$3.85 \times (11/23) + 2.80 \times (6/23) + 5.00 \times (6/23) = 3.9$$

c. **Dining Facilities.** The dining facilities criteria also consists of three factors: average age, percent permanent, and a judgment factor.

(1) *Average Age Factor.* The dining facility average age factor is found by determining the average age of dining facilities at each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of dining facilities was obtained using the FIPS database. Records with catcodes 72210, 72220, or 72290 were counted as dining facilities. Calculate the average age at each installation by multiplying each facility's size by its age and dividing that sum by the sum of all facility sizes. There is only one dining facility in the FIPS system at Camp Giant. The dining facility (catcode 72210) at Camp Giant was built in 1960, giving an average age of 30 based on 1990 calculations.

(b) *Average Age Factor.* An average age was determined for dining facilities at the forty installations. Each installation was then assigned an average age factor on a scale ranging from one to ten. Calculate this factor by:

-- subtracting the lowest average age from the installation age

-- dividing the total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the dining facilities criteria was 38. The lowest calculated average age was 1. The average age factor for Camp Giant (2.16) is calculated as follows:

$$10 \quad [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((30 - 1)/(38 - 1))] = 2.16$$

(2) *Percent Permanent Factor.* The dining facility percent permanent factor is found by determining the percentage of dining facilities at an installation located in permanent or semi-permanent buildings. The list of dining facilities for each installation was divided into two groups, permanent and temporary, using the FIPS database. The total square footage of the permanent dining facilities divided by the total square footage of dining facility buildings, multiplied by ten, gives the percent permanent factor used in the study. Camp Giant's only dining facility is located in a semi-permanent building, therefore the percent permanent factor for dining facilities at Camp Giant is 10.

(3) *Judgment Factor.* The dining facility judgment factor was determined by input from the facilities opinion surveys shown in Figure 6. Results from opinion surveys were averaged to determine a rating for each of the installations. All work, dining, and unaccompanied personnel housing facilities at an installation received the same facility rating. Camp Giant received a facility judgment factor of 5.0. Paragraph (3) on page 6, describes the calculations.

(4) *Dining Facilities Rating.* The overall dining facilities rating is found by multiplying the three factors times their weighting factor divided by the sum of the weighting factors, and adding. The dining facilities rating is:

$$2.16 \times (9/19) + 10.00 \times (5/19) + 5.00 \times (5/19) = 5.0$$

d. **Unaccompanied Personnel Housing Facilities.** The unaccompanied personnel housing facilities criteria consists of three factors: average age, percent permanent, and a judgment factor.

(1) *Average Age Factor.* The unaccompanied personnel housing facility average age factor was found by determining the average age of unaccompanied personnel housing facilities at each installation and assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* Using the FIPS database, a list of unaccompanied personnel housing facilities was obtained. Records with catcodes beginning with 721 (Enlisted Barracks) or 724 (Officers Quarters) counted as unaccompanied personnel housing facilities.

Figure 7 shows the list of unaccompanied personnel housing facilities from the FIPS system at Camp Giant. The database contained the catcode of the facility, the year the facility was built, and the size of the facility. The two columns showing the age and age multiplied by size, were used to determine the average age of the unaccompanied personnel housing facilities at Camp Giant. To determine the average age of unaccompanied personnel housing facilities at Camp Giant the total age multiplied by the size of unaccompanied personnel housing facilities was divided by the total size of unaccompanied personnel housing facilities.

CATCODE	YEAR BUILT	SIZE (SF)	AGE (1990)	AGE x SIZE
72111	1958	960	32	30720
72111	1983	7299	7	51093
72111	1986	7803	4	31212
72111	1986	7803	4	31212
72111	1970	9695	20	193900
72410	1958	1284	32	41088
72410	1987	5910	3	17730
TOTALS:		40754		396955

AVERAGE AGE: 396955/40754 = 9.74 years

Figure 7. UNACCOMPANIED PERSONNEL HOUSING AVERAGE AGE CALCULATIONS

(b) *Average Age Factor.* An average age was determined for unaccompanied personnel housing facilities at each of the installations. The installations were then assigned an average age factor on a scale ranging from one to ten. Calculate this factor by:

-- subtracting the lowest average age from the installation age

-- dividing the total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the unaccompanied housing facilities criteria was 35.98. The lowest calculated average age was 1. The average age factor for Camp Giant (7.50) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((9.74 - 1)/(35.98 - 1))] = 7.50$$

(2) *Percent Permanent Factor.* The unaccompanied personnel housing facility percent permanent factor was found by determining the percentage of unaccompanied personnel housing facilities located in permanent or semi-permanent buildings. The list of unaccompanied personnel housing facilities for each installation was divided into two groups, permanent and temporary, using the FIPS database. **Figure 8** lists the unaccompanied personnel housing facilities for Camp Giant. To get the percent permanent factor for unaccompanied personnel housing facilities used in this study, divide the total square footage of permanent housing facilities by the total square footage of housing facility buildings and multiply by ten. Camp Giant's percent permanent factor for unaccompanied personnel housing facilities is 9.4.

CATCODE	TYPE OF BUILDING	SIZE (SF)
72111	Temporary	960
72410	Temporary	1284
	TOTAL:	2244
72111	Semi-Permanent	7299
72111	Semi-Permanent	7803
72111	Semi-Permanent	7803
72111	Semi-Permanent	9695
72410	Semi-Permanent	5910
	TOTAL:	38510

(38510/(38510+2244)) × 10 = 9.4

Figure 8. UNACCOMPANIED PERSONNEL HOUSING PERCENT PERMANENT CALCULATIONS

(3) *Judgment Factor.* The facility judgment factor was determined by input from opinion surveys. The results of the opinion surveys were averaged to determine a rating for each of the installations. All work, dining, and unaccompanied personnel housing facilities at an installation received the same facility rating. Camp Giant received a facility judgment factor of 5.0. Paragraph (3) on page 6 describes the calculations.

(4) *Unaccompanied Personnel Housing Facilities Rating.* To find the overall unaccompanied personnel housing facilities rating, multiply the three factors times their weighting factor, divide by the sum of the weighting factors, and add. The unaccompanied personnel housing rating is:

$$7.50 \times (13/30) + 9.40 \times (8/30) + 5.00 \times (9/30) = 7.3$$

e. **Family Housing and School Facilities.** The family housing and school facilities rating is determined by the availability of both facilities at the installation and the opinion survey ratings of those facilities. If these facilities are not located on the installation, the criteria receives a 0.0 rating. Camp Giant has no family housing or school facilities. If the installation had these facilities, experts were asked to evaluate the facilities at each installation. Each of the possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled and divided by the number of surveys received. Only Camp Henry, Camp Walker and Camp Hialeah have family housing facilities. Camp Henry and Camp Walker received family housing facility ratings of 10. Camp Hialeah received a family housing facility rating of 5.

f. **Facilities Final Rating.** The final facilities worksheet rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. Weighting factors for facilities were determined by averaging results of expert surveys shown in Figure 2. The final facilities rating for Camp Giant is 4.0 and is calculated as follows:

$$3.9 \times (23/100) + 5.0 \times (19/100) + 7.3 \times (30/100) + 0.0 \times (28/100) = 4.0$$

7. **MEDICAL WORKSHEET.** The medical worksheet contains two major criteria, medical facilities and dental facilities. These criteria are broken down into factors as shown in Figure 1. The weighting factors that apply to these criteria were determined by the averaged results of opinion surveys distributed by the study team. **Figure 9** shows a sample survey used to determine weighting factors for the medical worksheet.

FACTORS TO BE WEIGHTED WITHIN MEDICAL FACILITIES

Consider the following factors that will be used to evaluate MEDICAL FACILITIES, based on their relative importance to United States Forces Korea as restationing options are examined.

1. **In your opinion how important are MEDICAL FACILITIES?** ___%

2. **In your opinion how important are DENTAL FACILITIES?** ___%

100%

Figure 9. MEDICAL WEIGHTING FACTORS OPINION SURVEY

a. **Medical Worksheet for Camp Giant.** **Figure 10** shows the Medical Decision Pad entries for Camp Giant.

CRITERION	WEIGHT	RATINGS
Medical Facilities	75	9.80
Average Age Factor	22	10.00
% Permanent	14	10.00
Distance Factor	27	9.38
Judgment Factor	12	10.00
Dental Facilities	25	5.90
Average Age Factor	7	1.38
% Permanent	5	10.00
Distance Factor	9	9.83
Judgment Factor	4	0.00

Figure 10. CAMP GIANT MEDICAL WORKSHEET ENTRIES

b. **Medical Facilities.** The medical facilities criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The medical facility average age factor was found by determining the average age of the medical facilities on each installation and assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of medical facilities was obtained by using the FIPS database. Records counted as medical facilities if they had catcodes beginning with 510 or 550. Results from opinion surveys were used to determine if medical facilities were available. If an installation did not have a medical facility, the facility at the nearest installation was used. The medical facility at Camp Pelham serves as the medical facility for Camp Giant and was two years old in 1990.

(b) *Average Age Factor.* After calculating the average age of the medical facility at each installation, the installation was assigned an average age factor on a scale of one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing the total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest average age for the medical facilities criteria was 31. The lowest average age was 2. The average age factor for Camp Giant (10.0) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((2 - 2)/(31 - 2))] = 10.0$$

(2) *Percent Permanent Factor.* The medical facility percent permanent factor was found by determining the percentage of medical facilities at an installation located in permanent or semi-permanent buildings. The medical facility at Camp Pelham is in a permanent facility. The percent permanent factor for Camp Giant is 10.00. Only two of the forty installations (Stanton and K-16 Airfield) studied use medical facilities located in temporary buildings. Their percent permanent factor for medical facilities was 0.00, the other installations had a percent permanent factor of 10.00.

(3) *Distance Factor.* If the medical facility was located on the installation, the distance factor was 10.00. If the medical facility was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from the installation distance

-- dividing that total by the difference of the longest distance and the installation distance

-- subtracting from one

-- multiplying by ten

The longest distance for the medical facilities criteria was 16 miles. The shortest distance was 0 miles. Camp Giant is one mile from Camp Pelham. The distance factor for Camp Giant (9.38) is calculated as follows:

$$10 \times [1\text{-}((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$
$$10 \times [1 - ((1 - 0)/(16 - 0))] = 9.38$$

(4) *Judgment Factor.* The medical facility judgment factor was determined by input from opinion surveys. Survey opinions were averaged to determine medical and dental facility ratings for each of the installations.

(a) *Opinion Surveys.* The study team asked the Eighth Army Surgeon's Office to evaluate medical facilities at each of the installations. They were asked to give medical and dental facilities ratings of good, fair, or poor. **Figure 11** shows a portion of a sample survey used to evaluate medical and dental facilities.

EVALUATION OF MEDICAL FACILITIES

Legend

0. No existing facilities
1. Medical only
2. Dental only
3. Medical and Dental

	GOOD	FAIR	POOR	N/A OR DON'T KNOW
WESTERN CORRIDOR				
CAMP EDWARDS	3			
CAMP HOWZE	1			
CAMP PELHAM	1		2	
CAMP GARY OWEN			1	
CAMP GIANT				0
CAMP BONIFAS				0
STANTON		1		

Figure 11. MEDICAL/DENTAL OPINION SURVEY

(b) *Judgment Rating.* Survey results were averaged to determine a medical and dental facilities rating for each of the installations. Each of the possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled and divided by the number of surveys received. Camp Giant received a medical facilities judgment rating of 10.

(5) *Medical Facilities Rating.* The overall medical facilities rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The medical facilities rating for Camp Giant is:

$$10.00 \times (22/75) + 10.00 \times (14/75) + 9.38 \times (27/75) + 10.00 \times (12/75) = 9.8$$

c. **Dental Facilities.** The dental facilities criteria consists of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The dental facility average age factor was found by determining the average age of dental facilities at each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of dental facilities was obtained using the FIPS database. Records counted as dental facilities if they had catcodes beginning with 540. Results from opinion surveys were also used to determine medical facilities available at each installation. If an installation did not have a dental facility, the dental facility at the nearest installation was used to calculate an average age factor. There is no dental facility at Camp Giant. The dental facility at Camp Pelham serves as the dental facility for Camp Giant. It was 27 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for the dental facilities at the forty installations, each installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the dental facilities criteria was 31. The lowest calculated average age was 2. The average age factor for Camp Giant (1.38) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((27 - 2)/(31 - 2))] = 1.38$$

(2) *Percent Permanent Factor.* The dental facility percent permanent factor was found by determining the percentage of dental facilities at an installation located in permanent or semi-permanent buildings. The list of dental facilities for each installation was divided into two groups, permanent and temporary, using the FIPS database. The total square footage of permanent dental facility buildings divided by the total square footage of all dental facility buildings, multiplied by ten, gives the percent permanent factor used in the study. The dental facility at Camp Pelham (used by Camp Giant) is located in a permanent facility, thus the percent permanent factor for Camp Giant is 10.00. All of the forty installations studied had dental facilities in permanent buildings, therefore, all of the installations had a percent permanent factor for dental facilities of 10.00.

(3) *Distance Factor.* If the dental facility was located on the installation, the distance factor was 10.00. If the dental facility was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from the installation distance

-- dividing that total by the difference of the longest distance and the installation distance

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to the nearest dental facility gave the longest distance used in the calculation. The longest distance for the dental facilities criteria was 60 miles. The shortest distance from any installation to the nearest dental facility gave the shortest distance used in the calculation. The shortest distance was 0 miles. Camp Giant is one mile from Camp Pelham. The distance factor for Camp Giant (9.83) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(60 - 0))] = 9.83$$

(4) *Judgment Factor.* The dental facility judgment factor was determined by input from opinion surveys as shown in Figure 11. Opinion survey ratings were averaged to determine dental facility ratings for each of the installations. The three possible ratings (good, fair, poor) were given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled for each installation and divided by the number of surveys received. The dental facility at Camp Pelham, which serves as the dental facility for Camp Giant, received an average survey rating of 0.00. Camp Giant and Camp Stanley were the only dental facilities that received a judgment rating of 0.00.

(5) *Dental Facilities Rating.* To find the overall dental facilities rating multiply the four calculated factors times their weighting factor divided by the sum of the weighting factors, and add. The overall dental facilities rating for Camp Giant is calculated as follows:

$$1.38 \times (7/25) + 10.00 \times (5/25) + 9.83 \times (9/25) + 0.00 \times (4/25) = 5.9$$

d. **Medical Facilities Final Rating.** To find the final medical facilities worksheet rating multiply the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and add. Weighting factors for medical facilities were determined by averaging results of expert surveys. The final medical facilities rating for Camp Giant is 8.8 and is calculated as follows:

$$9.8 \times (75/100) + 5.9 \times (25/100) = 8.8$$

8. **INFRASTRUCTURE WORKSHEET.** The infrastructure worksheet contains four major criteria as shown in Figure 1. The major criteria are roads, water utilities, sewer utilities, and electrical utilities. The weighting factors for infrastructure facilities were determined by the averaged results from the opinion surveys distributed by the study team. **Figure 12** shows a sample survey used to determine weighting factors for the infrastructure worksheet.

FACTORS TO BE WEIGHTED WITHIN INFRASTRUCTURE

Consider the following factors that will be used to evaluate INFRASTRUCTURE, based on their relative importance to United States Forces Korea as restationing options are examined.

1. **In your opinion how important are ROADS?** ___%
2. **In your opinion how important are WATER FACILITIES?** ___%
3. **In your opinion how important are SEWER UTILITIES?** ___%
4. **In your opinion how important are ELECTRICAL UTILITIES?** ___%

___%
100 %

Figure 12. INFRASTRUCTURE WEIGHTING FACTORS OPINION SURVEY

a. **Infrastructure Worksheet for Camp Giant.** **Figure 13** shows the Infrastructure Decision Pad entries for Camp Giant.

CRITERION	WEIGHT	RATINGS
Roads	22	10.00
Water	25	10.00
Sewer	25	10.00
Electric	28	10.00

Figure 13. CAMP GIANT INFRASTRUCTURE WORKSHEET ENTRIES

b. **Opinion Surveys.** While in Korea the study team distributed infrastructure opinion surveys. Experts were asked to evaluate the roads, water utilities, sewer utilities, and electrical utilities at each of the installations. The survey asked the experts to give installation ratings of good, fair, or poor. **Figure 14** shows a portion of a sample infrastructure survey.

INFRASTRUCTURE EVALUATION

	ROADS			WATER			SEWER			ELECTRICITY			
	GOOD	FAIR	POOR	GOOD	FAIR	POOR	GOOD	FAIR	POOR	GOOD	FAIR	POOR	N/A OR DON'T KNOW
WESTERN CORRIDOR													
CAMP EDWARDS	X			X			X			X			
CAMP HOWZE	X			X			X			X			
CAMP PELHAM	X			X			X			X			
CAMP GARY OWEN	X			X			X			X			
CAMP GIANT	X			X			X			X			
CAMP BONIFAS	X			X			X			X			
STANTON	X			X			X			X			
CAMP GREAVES	X			X			X			X			
CAMP LIBERTY BELL	X				X		X				X		
4 PAPA 3	X				X		X				X		

Figure 14. INFRASTRUCTURE OPINION SURVEY

c. **Judgment Rating.** Survey results were averaged to determine an infrastructure rating for each of the installations. Each of the possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled and divided by the number of surveys received. Camp Giant received an infrastructure judgment rating of 10.00 for each of the infrastructure criteria.

d. **Infrastructure Final Rating.** The final infrastructure worksheet rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. Weighting factors for infrastructures were determined by averaging results of expert surveys. The final infrastructure rating for Camp Giant is 10.00 and is calculated as follows:

$$10.00 \times (22/100) + 10.00 \times (25/100) + 10.00 \times (25/100) + 10.00 \times (28/100) = 10.00$$

9. **SAFETY WORKSHEET.** The safety worksheet contains four major criteria as shown in Figure 1. The major criteria are aviation, ammunition storage, industrial safety and vehicle/pedestrian safety. The weighting factors for safety criteria were determined by the averaged results from the opinion surveys distributed by the study team. **Figure 15** shows a sample survey used to determine weighting factors for the safety worksheet.

FACTORS TO BE WEIGHTED WITHIN SAFETY

Consider the following factors that will be used to evaluate SAFETY, based on their relative importance to United States Forces Korea as restationing options are examined.

1. **In your opinion how important is AVIATION SAFETY?** ___%
2. **In your opinion how important is AMMUNITION STORAGE SAFETY?** ___%
3. **In your opinion how important is VEHICLE/PEDESTRIAN SAFETY?** ___%
4. **In your opinion how important is INDUSTRIAL SAFETY?** ___%

___%
100 %

Figure 15. SAFETY WEIGHTING FACTORS OPINION SURVEY

a. **Safety Worksheet for Camp Giant.** **Figure 16** shows the Safety Decision Pad entries for Camp Giant.

CRITERION	WEIGHT	RATINGS
Aviation	22	0.00
Ammo Storage	25	5.00
Vehicle/Pedestrian	25	5.00
Industrial	28	5.00

Figure 16. CAMP GIANT SAFETY WORKSHEET ENTRIES

b. **Opinion Surveys.** While in Korea the study team asked the United States Forces Korea Command Safety Office to evaluate aviation, ammunition, industrial and vehicle/pedestrian as good, fair or poor at each of the installations. **Figure 17** snows a portion of the survey the United States Forces Korea Command Safety office used to evaluate installation safety.

EVALUATION OF SAFETY FACTORS

	Aviation				Ammunition				Traffic				Industrial				TOTAL			
	GOOD	FAIR	POOR	N/A OR DON'T KNOW	GOOD	FAIR	POOR	N/A OR DON'T KNOW	GOOD	FAIR	POOR	N/A OR DON'T KNOW	GOOD	FAIR	POOR	N/A OR DON'T KNOW	GOOD	FAIR	POOR	N/A OR DON'T KNOW
WESTERN CORRIDOR																				
CAMP EDWARDS			X			X				X			X					X		
CAMP HOWZE		X				X				X				X				X		
CAMP PELHAM			X				X				X			X					X	
CAMP GARY OWEN		X				X				X				X				X		
CAMP GIANT			X			X				X				X				X		
CAMP BONIFAS		X				X				X				X				X		
STANTON		X					X			X				X					X	
CAMP GREAVES		X				X				X				X				X		
CAMP LIBERTY BELL		X				X				X				X				X		
4 PAPA 3		X				X				X			X					X		

Figure 17. SAFETY OPINION SURVEY

c. **Judgment Rating.** The United States Forces Korea Command Safety Office results were used to assign a safety rating for each of the four safety criterion at the forty installations. Each of the three possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Camp Giant received a safety rating of poor (0) for the aviation safety criteria. The camp received a fair (5) rating for each of the other three safety criteria (ammunition, industrial and vehicle/pedestrian safety).

d. **Safety Final Rating.** The final safety worksheet rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. The final safety rating for Camp Giant is 3.9 and is calculated as follows:

$$0.00 \times (22/100) + 5.00 \times (25/100) + 5.00 \times (25/100) + 5.00 \times (28/100) = 3.9$$

10. **MORALE, WELFARE AND RECREATION (MWR) WORKSHEET.** The MWR worksheet contains **nine** major criteria, broken down into factors as shown in Figure 1. The major criteria are: bowling centers, theaters, recreation centers, post exchanges, libraries, clubs, commissaries, gymnasiums, and golf courses. If an installation did not have a particular MWR facility, the facility at the nearest installation was considered to serve both installations. The only MWR facility of the nine considered at Camp Giant was a club. The weighting factors for the MWR criteria were determined by the averaged results of the opinion surveys distributed by the study team. **Figure 18** shows a small portion of a sample survey used to determine weighting factors for the MWR worksheet.

a. **MWR Worksheet for Camp Giant. Figure 19** shows the MWR Decision Pad entries for Camp Giant.

b. **Bowling Centers.** The bowling centers criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The bowling centers average age factor was found by determining the average age of bowling centers at each installation and then assigning the installation a factor ranging from one to ten.

(a) *Average Age Calculations.* Using the FIPS database, a list of bowling centers was obtained. Records counted as bowling centers if they had 74011 catcodes. If an installation did not have a bowling center, the bowling center at the nearest installation was considered to service both installations and was used to calculate an average age factor. There is no bowling center at Camp Giant. The nearest bowling center is located at Camp Pelham and is considered the bowling center for Camp Giant. It was a year old in 1990.

(b) *Average Age Factor.* Once an average age was determined for bowling centers at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by;

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the bowling center criteria was 31. The lowest calculated average age was 1. The average age factor for Camp Giant (10.00) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((1 - 1)/(31 - 1))] = 10.00$$

FACTORS TO BE WEIGHTED WITHIN MWR

Consider the following factors that will be used to evaluate MORALE, WELFARE and RECREATION FACILITIES, based on their relative importance to United States Forces Korea as restationing options are examined.

1. bowling alleys

In your opinion are bowling alleys:
much more important than -- ____
more important than -- ____
about the same as -- theaters? ____
less important than -- ____
much less important than -- ____

In your opinion are bowling alleys:
much more important than -- ____
more important than -- ____
about the same as -- libraries? ____
less important than -- ____
much less important than -- ____

In your opinion are bowling alleys:
much more important than -- ____
more important than -- ____
about the same as -- clubs? ____
less important than -- ____
much less important than -- ____

In your opinion are bowling alleys:
much more important than -- ____
more important than -- ____
about the same as -- commissaries? ____
less important than -- ____
much less important than -- ____

In your opinion are bowling alleys:
much more important than -- ____
more important than -- ____
about the same as -- golf courses? ____
less important than -- ____
much less important than -- ____

Figure 18. MWR WEIGHTING FACTORS OPINION SURVEY

CRITERION	WEIGHT	RATINGS
Bowling Centers	9	9.10
Average Age Factor	3	10.00
% Permanent	2	10.00
Distance Factor	3	9.55
Judgment Factor	1	3.30
Theaters	9	3.90
Average Age Factor	3	0.86
% Permanent	2	0.00
Distance Factor	3	9.83
Judgment Factor	1	3.30
Recreation Centers	10	3.70
Average Age Factor	3	0.86
% Permanent	2	0.00
Distance Factor	3	9.83
Judgment Factor	2	3.30
Post Exchanges	15	4.10
Average Age Factor	5	1.67
% Permanent	3	0.00
Distance Factor	5	9.38
Judgment Factor	2	3.30
Libraries	9	2.90
Average Age Factor	3	0.67
% Permanent	2	0.00
Distance Factor	3	6.88
Judgment Factor	1	3.30
Clubs	13	6.50
Average Age Factor	4	2.11
% Permanent	2	10.00
Distance Factor	5	10.00
Judgment Factor	2	3.30
Commissaries	15	6.60
Average Age Factor	5	7.14
% Permanent	3	10.00
Distance Factor	5	5.33
Judgment Factor	2	3.30
Gymnasiums	12	8.50
Average Age Factor	4	9.43
% Permanent	2	10.00
Distance Factor	4	9.38
Judgment Factor	2	3.30
Golf Courses	8	5.70
Distance Factor	8	5.69

Figure 19. CAMP GIANT MWR WORKSHEET ENTRIES

(2) *Percent Permanent Factor.* The bowling center percent permanent factor was found by determining the percentage of bowling centers at an installation located in permanent or semi-permanent buildings. The bowling center at Camp Pelham (used by Camp Giant) is located in a permanent facility, thus the percent permanent factor for Camp Giant is 10.00. Only one installation (Camp Page) of the forty studied had bowling centers in temporary buildings. The percent permanent factor for the bowling center at Camp Page was 0.00, the other installations had a percent permanent factor of 10.00.

(3) *Distance Factor.* If the bowling center was located on the installation, the distance factor was 10.00. If the bowling center was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest bowling center, from the distance to the bowling center used by this installation

-- dividing that total by the difference of the longest distance from any installation to the nearest bowling center and the shortest distance from any installation to the nearest bowling center

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to a bowling center was 22 miles. The shortest distance from any installation to the nearest bowling center was 0 miles. Camp Giant is one mile from the bowling center at Camp Pelham. The distance factor for Camp Giant (9.55) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(22 - 0))] = 9.55$$

(4) *Judgment Factor.* The MWR judgment factors were determined by input from opinion surveys. Opinion survey results were averaged to determine all MWR ratings for each of the installations.

(a) *Opinion Surveys.* While in Korea, the Engineer Studies Center study team distributed MWR opinion surveys. Experts were asked to evaluate MWR facilities at each of the installations. The survey asked the experts to give MWR facilities ratings of good, fair, or poor. **Figure 20** shows a portion of a sample survey used to evaluate MWR facilities.

(b) *Judgment Rating.* Survey results were averaged to determine a single MWR facilities rating for each of the installations. Each of the three possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled and divided by the number of surveys received. Camp Giant received a MWR judgment rating of 3.30. Every MWR facility at Camp Giant in the MWR Decision Pad worksheet received a judgment factor of 3.30.

EVALUATION OF MWR FACILITIES

Evaluate by installation if possible, if not evaluate by community area.

	GOOD	FAIR	POOR
WESTERN CORRIDOR			
CAMP EDWARDS		X	
CAMP HOWZE		X	
CAMP PELHAM	X		
CAMP GARY OWEN		X	
GAMP GIANT		X	
CAMP BONIFAS		X	
STANTON		X	

Figure 20. MWR OPINION SURVEY

(5) *Bowling Centers Rating.* To find the overall bowling centers rating multiply the four factors times their weighting factor divided by the sum of the weighting factors, and add. The bowling centers rating at Camp Giant is:

$$10.00 \times (3/9) + 10.00 \times (2/9) + 9.55 \times (3/9) + 3.30 \times (1/9) = 9.1$$

c. **Theaters.** The theaters criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The theaters average age factor was found by determining the average age of theaters at each installation and then assigning the installation a factor ranging from one to ten.

(a) *Average Age Calculations.* By using the FIPS database, a list of theaters was obtained. Records counted as theaters if they had 74076 or 74077 catcodes. If an installation did not have a theater, the theater at the nearest installation was used to calculate an average age factor. The theater at Camp Pelham was used as the theater for Camp Giant. It was 34 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for theaters at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the theaters criteria was 37. The lowest calculated average age was 2. The average age factor for Camp Giant (0.86) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((34 - 2)/(37 - 2))] = 0.86$$

(2) ***Percent Permanent Factor.*** The theater percent permanent factor was found by determining the percentage of theaters at an installation located in permanent or semi-permanent buildings. The list of theaters for each installation was divided into two groups, permanent and temporary, using the FIPS database. The total square footage of permanent theater buildings divided by the total square footage of all theater buildings, multiplied by ten, gives the percent permanent factor at each installation used in the study. The theater at Camp Pelham (used by Camp Giant) is located in a temporary facility. The percent permanent factor for Camp Giant is 0.00.

(3) ***Distance Factor.*** If the theater was located on the installation, the distance factor was 10.00. If the theater was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest theater, from the distance to the nearest theater for this installation;

-- dividing that total by the difference of the longest distance from any installation to the nearest theater and the shortest distance from any installation to the nearest theater

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to the nearest theater was 60 miles. The shortest distance was 0 miles. The theater at Camp Pelham is one mile from Camp Giant so the distance factor (9.83) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(60 - 0))] = 9.83$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Thus, every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Paragraph (4) on page 24 describes the calculations.

(5) *Theaters Rating.* The overall theaters rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The theaters facilities rating for Camp Giant is:

$$0.86 \times (3/9) + 0.00 \times (2/9) + 9.83 \times (3/9) + 3.30 \times (1/9) = 3.9$$

d. **Recreation Centers.** The recreation centers criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The recreation centers average age factor was found by determining the average age of recreation centers at each installation and then assigning the installation a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of recreation centers was obtained using the FIPS database. Records counted as recreation centers if they had 74068, 74069, or 74033 catcodes. If an installation did not have a recreation center, the recreation center at the nearest installation was used to calculate an average age factor. The recreation center at Camp Pelham was 34 years old in 1990 and is used as the recreation center facility at Camp Giant.

(b) *Average Age Factor.* Once an average age was determined for recreation centers at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the recreation centers criteria was 37. The lowest calculated average age was 2. The average age factor for Camp Giant (0.86) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((34 - 2)/(37 - 2))] = 0.86$$

(2) *Percent Permanent Factor.* The recreation centers percent permanent factor was found by determining the percentage of recreation centers at an installation located in permanent or semi-permanent buildings. The list of recreation centers for each installation was divided into two groups, permanent and temporary, by using the FIPS database. The total square footage of permanent recreation center buildings divided by the total square footage of all recreation center

buildings, multiplied by ten, gives the percent permanent factor used in the study. The recreation center at Camp Pelham (used by Camp Giant) is located in a temporary facility. The percent permanent factor for Camp Giant is 0.00.

(3) *Distance Factor.* If the recreation center was located on the installation, the distance factor was 10.00. If the center was located at the nearest installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest recreation center from the distance for this installation to the nearest recreation center

-- dividing that total by the difference of the longest distance from any installation to the nearest center and the shortest distance from any installation to the nearest center

-- subtracting from one

-- multiplying by ten

The longest distance for the recreation center criteria was 16 miles. The shortest distance was 0 miles. There is no recreation center at Camp Giant. It is one mile to the recreation center at Camp Pelham. The distance factor (9.38) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(16 - 0))] = 9.38$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Paragraph (4) on page 24 describes the calculations.

(5) *Recreation Centers Rating.* The overall recreation centers rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant recreation centers facilities rating is:

$$0.86 \times (3/10) + 0.00 \times (2/10) + 9.38 \times (3/10) + 3.30 \times (2/10) = 3.7$$

c. **Post Exchanges.** The post exchanges criteria consists of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The post exchanges average age factor was found by determining the average age of post exchange centers on each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of post exchange facilities was obtained using the FIPS database. Records counted as post exchange centers if they had 74050 or 74053 catcodes. If an installation did not have a post exchange, the post exchange at the nearest installation was used to calculate an average age factor. The post exchange at Camp Pelham serves as the post exchange for Camp Giant and was 34 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for post exchange centers at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the post exchange criteria was 40. The lowest calculated average age was 4. The average age factor for Camp Giant (1.67) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((34 - 4)/(40 - 4))] = 1.67$$

(2) *Percent Permanent Factor.* The post exchange percent permanent factor was found by determining the percentage of post exchange centers at an installation located in permanent or semi-permanent buildings. By using the FIPS database, the list of post exchange centers for each installation was divided into two groups, permanent and temporary. The total square footage of permanent post exchange buildings divided by the total square footage of all post exchange buildings at an installation, multiplied by ten, gives the percent permanent factor used in the study. The post exchange center at Camp Pelham (used by Camp Giant) is located in a temporary facility. The post exchange percent permanent factor for Camp Giant is 0.00.

(3) *Distance Factor.* If the post exchange was located on the installation, the distance factor was 10.00. If the post exchange was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest post exchange from the distance to the nearest post exchange for this installation

-- dividing that total by the difference of the longest distance from any installation to the nearest post exchange and the shortest distance from any installation to the nearest post exchange

-- subtracting from one

-- multiplying by ten

The longest distance for the post exchange criteria was 16 miles. The shortest distance was 0 miles. There is no post exchange facility at Camp Giant. The facility at Camp Pelham (used by Camp Giant) is one mile away. The distance factor (9.38) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(16 - 0))] = 9.38$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Paragraph (4) on page 24 describes the calculations.

(5) *Post Exchange Rating.* The overall post exchange rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant post exchange facilities rating is:

$$1.67 \times (5/15) + 0.00 \times (3/15) + 9.38 \times (5/15) + 3.30 \times (2/15) = 4.1$$

f. **Libraries.** The libraries criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The libraries average age factor was found by determining the average age of the libraries on each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of libraries was obtained by using the FIPS database. Records counted as libraries if they had 74040, 74041, or 74044 catcodes. If an installation did not have a library, the library at the nearest installation was used to calculate an average age factor. The library at Camp Gary Owen is the closest library to Camp Giant and was 35 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for libraries at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the library criteria was 37. The lowest calculated average age was 7. The average age factor for the library at Camp Gary Owen (used by Camp Giant) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((35 - 7)/(37 - 7))] = 0.67$$

(2) *Percent Permanent Factor.* The library percent permanent factor was found by determining the percentage of libraries on an installation located in permanent or semi-permanent buildings. By using the FIPS database, the list of libraries for each installation was divided into two groups, those located in permanent buildings and those located in temporary buildings. The total square footage of permanent library buildings on an installation divided by the total square

footage of all library buildings at the installation, multiplied by ten, gives the library percent permanent factor used in the study. The library at Camp Gary Owen (used by Camp Giant) is located in a temporary facility. The library percent permanent factor for Camp Giant is 0.00.

(3) *Distance Factor.* If the library is located on the installation, the distance factor is 10.00. If the library is located at a different installation, the distance factor is calculated by:

-- subtracting the shortest distance from any installation to the nearest library from the distance to the nearest library to this installation

-- dividing that total by the difference of the longest distance from any installation to the nearest library and the shortest distance from any installation to the nearest library

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to the nearest library was 16 miles. The shortest distance for the library criteria was 0 miles. There is a library facility at Camp Gary Owen that is five miles from Camp Giant and serves as the Camp Giant library. The library distance factor for Camp Giant (6.88) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((5 - 0)/(16 - 0))] = 6.88$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Thus, every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Calculations are described in paragraph (4) on page 24.

(5) *Library Rating.* The overall library rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant library facilities rating is:

$$0.67 \times (3/9) + 0.00 \times (2/9) + 6.88 \times (3/9) + 3.30 \times (1/9) = 2.9$$

g. **Clubs.** The clubs criteria is made up of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The clubs average age factor was found by determining the average age of clubs at each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of clubs was obtained using the FIPS database. Records counted as clubs if they had 74046, 74047, or 74048 catcodes. If an installation did not have a club, the club at the nearest installation was considered to serve as the club for both installations and was used to calculate an average age factor. Camp Giant has one club that was 31 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for clubs at the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was found by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest average age for the clubs criteria was 39. The lowest average age was 1. The average age factor for Camp Giant (2.11) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((31 - 1)/(39 - 1))] = 2.11$$

(2) *Percent Permanent Factor.* The clubs percent permanent factor was found by determining the percentage of clubs at an installation located in permanent or semi-permanent buildings. By using the FIPS database, the list of clubs for each installation was divided into two groups, permanent and temporary. The total square footage of permanent club buildings divided by the total square footage of all club buildings, multiplied by ten, gives the percent permanent factor used in the study. The club at Camp Giant is located in a permanent facility. The club percent permanent factor for Camp Giant is 10.00.

(3) *Distance Factor.* If the club is located on the installation, the distance factor is 10.00. If the club is located at a different installation, the distance factor is calculated by:

-- subtracting the shortest distance from any installation to the nearest club from the distance from this installation to the nearest club

-- dividing that total by the difference of the longest distance from any installation to the nearest club and the shortest distance from any installation to the nearest club

-- subtracting from one

-- multiplying by ten

The longest distance was 5 miles. The shortest distance was 0 miles. Only two installations (Seattle and Camp Falling Water) did not have clubs located on the installation. There is a club facility at Camp Giant. The distance factor (10.00) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((0 - 0)/(16 - 0))] = 10.00$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Thus, every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Calculations are described in paragraph (4) on page 24.

(5) *Club Rating.* The overall club rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant club facilities rating is:

$$2.11 \times (4/13) + 10.00 \times (2/13) + 10.00 \times (5/13) + 3.30 \times (2/13) = 6.5$$

h. **Commissaries.** The commissaries criteria consists of four factors: average age, percent permanent, distance, and a judgment factor.

(1) *Average Age Factor.* The commissaries average age factor was found by determining the average age of commissaries at each installation and then assigning the installation a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of commissaries was obtained using the FIPS database. Records counted as commissaries if they had 74021 catcodes. If an installation did not have a commissary, the commissary at the nearest installation was used to calculate an average age factor. There is no commissary at Camp Giant. The commissary located in Seoul also serves as the commissary for Camp Giant. It was 12 years old in 1990.

(b) *Average Age Factor.* Once an average age was determined for commissaries at each of the forty installations, the installation was assigned an average age factor on a scale ranging from one to ten. This factor was calculated by:

-- subtracting the lowest average age from the installation age

-- dividing that total by the difference of the highest average age and the lowest age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the commissary criteria was 37. The lowest calculated average age was 2. The average age factor for Camp Giant (7.14) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((12 - 2)/(37 - 2))] = 7.14$$

(2) *Percent Permanent Factor.* The commissary percent permanent factor was found by determining the percentage of commissaries at an installation located in permanent or semi-permanent buildings. The list of commissaries for each installation was divided into two groups, permanent and temporary, using the FIPS database. The total square footage of permanent commissary buildings divided by the total square footage of all commissary buildings, multiplied by ten, gives the percent permanent factor used in the study. Only three of the forty installations (Camp Stanley, Camp Page, and Camp Carroll) studied had commissaries in temporary buildings. The commissary in Seoul (used by Camp Giant) is located in a permanent facility. The commissary percent permanent factor for Camp Giant is 10.00.

(3) *Distance Factor.* If the commissary was located on the installation, the distance factor was 10.00. If the commissary was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from the distance from this installation to the nearest commissary

-- dividing that total by the difference of the longest distance and the shortest distance from any installation to the nearest commissary

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to a commissary was 60 miles. The shortest distance was 0 miles. Camp Giant is 28 miles from Seoul where the nearest commissary is located. The distance factor for Camp Giant (5.33) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((28 - 0)/(60 - 0))] = 5.33$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30. Every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Calculations are described in paragraph (4) on page 24.

(5) *Commissary Rating.* The overall commissary rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant commissary facilities rating is:

$$7.14 \times (5/15) + 10.00 \times (3/15) + 5.33 \times (5/15) + 3.30 \times (2/15) = 6.6$$

i. **Gymnasiums.** The gymnasium criteria consists of four factors: average age, percent permanent, distance and a judgment factor.

(1) *Average Age Factor.* The average age factor for each gymnasium was found by determining the average age of the gymnasium at each installation and then assigning them a factor ranging from one to ten.

(a) *Average Age Calculations.* A list of gymnasiums was obtained using the FIPS database. Records with catcodes of 74028 or 74034 counted as gymnasiums. If an installation did not have a gymnasium, the gymnasium at the nearest installation was used to calculate an average age factor. Camp Giant does not have a gymnasium. The nearest gymnasium is at Camp Pelham and was four years old in 1990.

(b) *Average Age Factor.* An average age was determined for gymnasiums at each of the forty installations. Each installation was assigned an average age factor on a scale ranging from one to ten. Calculate this factor by:

-- subtracting the lowest average age from the installation age

-- dividing the total by the difference of the highest average age and the calculated age

-- subtracting from one

-- multiplying by ten

The highest calculated average age for the gymnasium criteria was 37. The lowest calculated average age was 2. The average age factor for Camp Giant (9.43) is calculated as follows:

$$10 \times [1-((\text{calculated age} - \text{lowest age})/(\text{highest age} - \text{lowest age}))]$$

$$10 \times [1 - ((4 - 2)/(37 - 2))] = 9.43$$

(2) *Percent Permanent Factor.* The gymnasium percent permanent factor is found by determining the percentage of gymnasiums at an installation located in permanent or semi-permanent buildings. The list of gymnasiums for each installation was divided into two groups, permanent and temporary by using the FIPS database. The total square footage of permanent gymnasium buildings divided by the total square footage of all gymnasium buildings, multiplied by ten, gives the percent permanent factor used in the study. The gymnasium used by Camp Giant is located in a permanent facility. The gymnasium percent permanent factor for Camp Giant is 10.00.

(3) *Distance Factor.* If the gymnasium was located on the installation, the distance factor was 10.00. If the gym was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest gym from the distance to the nearest gym for this installation

-- dividing that total by the difference of the longest distance from any installation to the nearest gym and the shortest distance from any installation to the nearest gym

-- subtracting from one

-- multiplying by ten

The longest distance for the gymnasium criteria was 16 miles. The shortest distance was 0 miles. There is no gymnasium at Camp Giant. It is one mile to the gym at Camp Pelham. The distance factor (9.38) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$

$$10 \times [1 - ((1 - 0)/(16 - 0))] = 9.38$$

(4) *Judgment Factor.* Camp Giant received a MWR facilities judgment rating of 3.30 after survey results were averaged. Every facility in the MWR Decision Pad worksheet received a judgment factor of 3.30 at Camp Giant. Calculations are described in paragraph (4) on page 24.

(5) *Gymnasium Rating.* The overall gymnasium rating is found by multiplying the four factors times their weighting factor divided by the sum of the weighting factors, and adding. The Camp Giant gymnasium facilities rating is:

$$9.43 \times (4/12) + 10.00 \times (2/12) + 9.38 \times (4/12) + 3.30 \times (2/12) = 8.5$$

j. **Golf Courses.** The golf courses criteria is made up of only one factor, distance. Each installation received a rating for the golf courses criteria based on how far that installation is from the nearest golf course. The study considered the golf courses at Camp Red Cloud, Camp Casey, Camp Walker, and Seoul. If the golf course was located on the installation, the distance factor was 10.00. If the golf course was located at a different installation, the distance factor was calculated by:

-- subtracting the shortest distance from any installation to the nearest golf course from the distance from this installation to the nearest golf course

-- dividing that total by the difference of the longest distance from any installation to the nearest golf course, and the shortest distance from any installation to the nearest golf course

-- subtracting from one

-- multiplying by ten

The longest distance from any installation to a golf course was 65 miles. The shortest distance was 0 miles. Camp Giant is 28 miles from Seoul where the nearest golf course is located. The distance factor for Camp Giant (5.69) is calculated as follows:

$$10 \times [1-((\text{distance} - \text{shortest distance})/(\text{longest distance} - \text{shortest distance}))]$$
$$10 \times [1 - ((28 - 0)/(65 - 0))] = 5.69$$

k. **MWR Final Rating.** The final MWR worksheet rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. The final MWR rating for Camp Giant is 5.00 and is calculated as follows:

$$9.1 \times (9/100) + 3.9 \times (9/100) + 3.7 \times (10/100) + 4.1 \times (15/100) + 2.9 \times (9/100)$$
$$+$$
$$6.5 \times (13/100) + 6.6 \times (15/100) + 8.5 \times (12/100) + 5.7 \times (8/100) = 5.7$$

11. **FINAL WORKSHEET.** The final worksheet contains four major criteria. The major criteria are: quality of life, location, size and urbanization. The weighting factors applied to each of these criteria were determined by averaged results from opinion surveys distributed by the study team. **Figure 21** shows a sample survey used to determine weighting factors for the Final worksheet.

a. **Final Worksheet for Camp Giant. Figure 22** shows the Final Decision Pad entries for Camp Giant.

b. **Quality of Life.** The quality of life criteria is made up of five factors: facilities, medical, infrastructure, safety, and MWR. Ratings for each of these factors came from the individual Decision Pad worksheets previously discussed. The final ratings for Camp Giant in each sub-worksheet were used to determine the overall quality of life rating for Camp Giant. The quality of life rating for Camp Giant is found by multiplying the five final ratings by their weighting factors divided by the sum of the weighting factors, and adding. The quality of life rating for Camp Giant (5.9) is calculated as follows:

$$4.0 \times (26/60) + 8.8 \times (7/60) + 10.0 \times (10/60) + 3.9 \times (6/60) + 5.7 \times (11/60) = 5.9$$

c. **Location.** The location criteria is made up of three factors: command, control and communications (C3); mission support; and accessibility.

(1) *Weighting Factors.* The weighting factors applied to each of the three location criteria were determined by the averaged results from the opinion surveys distributed by the study team. **Figure 23** shows a sample survey used to determine weighting factors for the location criteria.

KEY CRITERIA TO BE WEIGHTED

Consider the following factors that will be used to evaluate United States installations in Korea based on their relative value to United States Forces Korea as restationing options are examined.

1. In your opinion how important is QUALITY OF LIFE? ___%

   QUALITY OF LIFE is the criterion used to assess the adequacy of installations in the following categories:
   - -- facilities (work areas; housing; dining; medical; and morale, welfare & recreation)
   - -- infrastructure (water, sewer, electricity, and roads)
   - -- safety (air operations, ammunition storage, vehicle/pedestrian, and industrial safety)

2. In your opinion how important is SIZE? ___%

   SIZE is the criterion used to assess the relative size of installations with the intention of favoring larger installations for retention. Installations will be categorized as:
   - -- large (greater than 300 acres)
   - -- medium (50 to 300 acres)
   - -- small (10 to 50 acres)
   - -- remote (less than 10 acres)

3. In your opinion how important is LOCATION? ___%

   LOCATION is the criterion used to assess the relative impact an installation's location has in the following categories:
   - -- positioning for mission performance
   - -- quality of command, control and communication
   - -- ease of accessibility

4. In your opinion how important is URBANIZATION? ___%

   URBANIZATION is the criterion used to assess the relative amount of urban encroachment by categorizing an installation's surroundings as:
   - -- urban
   - -- suburban
   - -- rural

100 %

Figure 21. FINAL WEIGHTING FACTORS OPINION SURVEY

CRITERION	WEIGHT	RATINGS
Quality of Life	60	5.90
Facilities	26	4.00
Medical	7	8.80
Infrastructure	10	10.00
Safety	6	3.90
MWR	11	5.70
Location	20	6.90
C3	6	6.30
Mission	9	6.30
Access	5	8.80
Size	13	3.30
Urbanization	7	10.00

Figure 22. CAMP GIANT FINAL WORKSHEET ENTRIES

KEY CRITERIA TO BE WEIGHTED

Consider the following factors that will be used to evaluate LOCATION based on its relative value to United States Forces Korea as restationing options are examined.

1. In your opinion how important is the impact of LOCATION on command, control and communication (C3)? ___%

2. In your opinion how important is the impact of LOCATION on mission support? ___%

3. In your opinion how important is the impact of LOCATION on accessibility? ___%

100 %

Figure 23. LOCATION CRITERIA WEIGHTING FACTORS OPINION SURVEY

(2) *Opinion Surveys.* The study team asked experts to evaluate the impact of location on command, control and communications; mission support; and accessibility, at each of the installations. **Figure 24** shows a portion of a sample survey used to evaluate installation location criteria.

LOCATION EVALUATION

	ACCESSIBILITY			C3			MISSION			
	GOOD	FAIR	POOR	GOOD	FAIR	POOR	GOOD	FAIR	POOR	N/A OR DON'T KNOW
WESTERN CORRIDOR										
CAMP EDWARDS	X			X			X			
CAMP HOWZE	X			X			X			
CAMP PELHAM		X			X			X		
CAMP GARY OWEN		X			X			X		
CAMP GIANT	X				X		X			
CAMP BONIFAS	X			X			X			
STANTON		X			X			X		
CAMP GREAVES	X			X			X			
CAMP LIBERTY BELL	X			X			X			
4 PAPA 3	X			X			X			

Figure 24. LOCATION OPINION SURVEY

(3) *Criteria Ratings.* Survey results were averaged to determine a location rating for each of the installations. Each of the possible ratings (good, fair, poor) was given a numerical value ranging from one to ten. A good rating scored 10 points, a fair rating scored 5 points and a poor rating scored 0 points. Points were totaled and divided by the number of surveys received. Camp Giant received an average location criteria rating of 6.3 for command, control and communications; 6.3 for mission support; and 8.8 for accessibility.

(4) *Location Final Rating.* The final location rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. The final location rating for Camp Giant is 6.9 and is calculated as follows:

$$6.3 \times (6/20) + 6.3 \times (9/20) + 8.8 \times (5/20) = 6.9$$

d. **Size.** The size criteria ratings were determined by the number of acres the installation contains. Installations were divided into four classes: large, medium, small and remote. Large installations contain more than 300 acres and receive a 10.0 rating. Medium installations contain between 50 and 300 acres and receive a 6.7 rating. Small installations contain between ten and fifty acres and receive a 3.3 rating. Remote installations contain less than ten acres and receive a 0 rating. Camp Giant received a size rating of 3.3.

e. **Urbanization.** The urbanization criteria ratings were determined by the location of an installation. Installations were divided into three classes: urban, suburban, and rural. Urban installations are located within a large city and receive a 0 rating. Suburban installations are located on the outskirts of a large city and receive a 5 rating. Rural installations are located away from major cities and receive a 10 rating. Camp Giant received an urbanization rating of 10.

f. **Final Rating.** The final installation rating is found by multiplying the overall criteria ratings times their weighting factor divided by the sum of the weighting factors, and adding. The final installation rating for Camp Giant is 6.0 and is calculated as follows:

$$5.9 \times (60/100) + 6.9 \times (20/100) + 3.3 \times (13/100) + 10.0 \times (7/100) = 6.0$$

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